other restrictions of the HCP, the degree of impact to covered amphibians and reptiles would not be expected to be substantial.

Northern California ESU steelhead
Refer to **Effects common to salmonids.**

Southern Oregon/California Coasts ESU coastal cutthroat trout
Refer to **Effects common to salmonids.**

Summary of species response to proposed action

LISTED SPECIES/CRITICAL HABITAT:
American peregrine falcon
Only one peregrine falcon nest site is currently known to exist on PALCO lands, at Scotia Bluffs. Two additional nest sites occur within the action area, but not on PALCO ownership. Future surveys may discover an undetermined number of additional nest sites but suitable habitat is limited. Conservation measures identified in the American Peregrine Falcon Conservation Plan are to be implemented for all present and future nest sites within the action area. If these conservation measures are successfully implemented, adverse effects due to disturbance from timber operations and other covered activities will be minimized. No pesticide-associated adverse effects are expected to occur as part of this action. No active nest sites or potential nest sites are likely to be destroyed as part of this action. Habitat modification may have some adverse effects on the species depending on the resulting habitats likely to be created during the 50 year implementation of the SYP/HCP. However, habitat loss has not been considered as a major threat to the peregrine in significant portions of its range, and has not precluded recovery of the species. In summary, conservation measures are likely to minimize disturbance, injury, and habitat loss for this species to the maximum extent practicable.

Northern spotted owl
The proposed action may affect and is likely to adversely affect the northern spotted owl. The response of the northern spotted owl to the proposed action over the 50-year period is described in relation to habitat conditions (e.g., removal, protection, distribution) and disturbance.

Habitat protection, in combination with the adaptive management strategy, would maintain at least 108 activity centers distributed throughout the PALCO lands. The population level may decline from a total of 156 to 108 activity centers, a potential reduction of 48 activity centers, due to adverse effects associated with the loss, localized distribution, or fragmentation of suitable habitat. In addition, an undetermined number of activity centers may be removed from the population of owls in the action area outside of the action area. The amount (177,173 acres) of suitable habitat at the end of 50 years may moderate these adverse effects and represents a gain of 6,769 acres, compared to current levels.

Northern spotted owls would remain distributed throughout the PALCO lands. Habitat conditions would allow for movement and interchange between occupied sites.

Reproduction would be monitored and corrective measures taken to ensure habitat conditions provide for an average reproduction level of 0.61 fledged young per pair over a 5-year period. The target rate represents the average observed on the PALCO lands from 1994 to 1998. Reproduction at individual sites may be affected. Site-specific factors such as location of activity center relative to proposed project areas, timing and intensity of actions may influence the degree of effect.

An undetermined number of individuals are subject to disturbance, injury, or death. Survey efforts and limited operating periods are expected to reduce the effect if owls are detected during survey efforts. Surveys may fail to detect some owls.

Although suitable habitat would be removed or modified throughout the permit period, the proposed action would result in a net gain of 6,769 acres of suitable habitat at a landscape level, compared to existing levels of 170,404 acres. The proportion of nesting habitat would shift from high to moderate quality. Suitable habitat would be protected in areas such as MMCAs, RMZs, and the Headwaters Reserve. A substantial amount of suitable habitat would be provided in the vicinity of 80 activity centers.

Most conservation needs of the species would be met. Suitable nesting, roosting, foraging, and dispersal habitat would be maintained in an adequate quantity, quality, and distribution to allow a reduced population to persist on the ownership. The population level on the PALCO lands would exceed a desired cluster size of 60 activity centers, contributing to the recovery of the species in the southern part of the regional area. The extent of territory overlap, however, cannot be predicted, but home ranges of owls at most activity centers may overlap, based on the distribution of suitable habitat. Habitat conditions would be stable for a limited number of activity centers, principally within MMCAs and those afforded Level One protection measures.

Bald eagle

The proposed action may affect and is likely to adversely affect the bald eagle. The response of the bald eagle to the proposed action over the 50-year period is described in relation to habitat conditions (e.g., removal, protection, distribution) and disturbance.

There are no known bald eagle nests on the PALCO lands and in the action area; thus, none would be affected unless new territories are formed. Few nests are likely to be discovered in the action area, based on the size of the regional nesting population. Survey efforts have a somewhat reduced likelihood of detecting nesting eagles in suitable habitat greater than 0.5 mile from Class I streams. An undetermined number of individuals or nest, roost, or perch sites may be affected in the vicinity of nest sites that have not been located prior to management activities. At least 11 wintering individuals may be adversely affected.

Conservation measures have a higher probability of reducing impacts on the reproduction of nesting eagles found within 0.5 mile of Class I streams.

Suitable habitat would be protected in large blocks, such as the Headwaters Reserve and in smaller blocks such as MMCA, adjacent to owl activity centers, RMZs, and other areas. These habitats would maintain options for nesting, roosting, and wintering eagles. A total of 39,940 acres of suitable habitat would exist on the PALCO lands at the end of 50 years, down from 69,231 acres. Suitable habitat would remain distributed throughout the PALCO lands. Habitat quality would be reduced, due to a loss of special habitat components.

The conservation needs of the species may be partially met if surveys fail to detect nesting or wintering eagles, due to the effect of disturbance on reproduction and the survival of individuals. PALCO lands, however, play a minor role in the recovery of the species, given the broad range of the species and limited nesting and wintering populations in the area. Suitable habitat would be maintained in an adequate quantity, quality, and distribution to allow a population to persist on the ownership if nesting or wintering areas are detected.

Marbled murrelet

Summary of the Adverse and Beneficial Effects of the Proposed SYP/HCP on the Marbled Murrelet

The following discussion provides a summary and conclusion regarding the Service's analysis of the combined adverse and beneficial effects of the proposed action on the marbled murrelet. The information presented earlier will be reviewed in the context of the potential effects to the species' numbers, reproduction, and distribution. These effects will be evaluated for both short and long term impacts, and they will also be discussed, where relevant, at the appropriate landscape and population scale.

Effect of the Action on Murrelet Numbers: The proposed action will adversely affect the murrelet and will result in the take of murrelets associated with 4,696 acres of known or likely occupied habitat. Most of these adverse effects will occur in the first five to ten years of the permit. Approximately 446 of these harvested acres are high quality UOG, while most of the remaining 4,250 acres are moderate to lower quality residual redwood stands or Douglas fir. In contrast, the action conserves 4,693 acres (91 percent) of the highest quality UOG and 4,137 acres (50 percent) of the likely occupied DFOG and ROG; much but not all of this ROG is higher quality than the ROG that is proposed for harvest. Similar to the approach adopted in other HCPs, the proposed action will conserve a large percentage of the highest quality habitat, which in turn is likely to harbor the largest percentage of successfully reproducing murrelets (Marbled Murrelet Recovery Team, November 30, 1998; P. Karieva, December 7, 1998).

In the short term, the total number of murrelets nesting on the ownership will likely be reduced from current levels for some indeterminable time period. It is expected that murrelet nesting densities and reproductive success will eventually increase within the reserve areas due to improving habitat conditions within the permit period.

Some analyses prepared by consultants to PALCO used the RBV calculation to conclude that 95 percent of the murrelets in the bioregion would be protected in the Headwaters reserve, SYP/HCP MMCAs, and state parks (Ralph et al. (1997 and 1998) in Draft SYP/HCP, Vol. IV, Part B, Sec. 9 and 10). In contrast, other murrelet scientists have suggested in public comments that the number of murrelets impacted by the proposed action will be significantly higher than the figures represented in the final EIS/EIR (H. Carter, pers. comm., Nov. 11, 1998; S. K. Nelson, pers. comm., November 12, 1998). The final EIS/EIR provides a number of best and worst case scenarios to consider the numbers of murrelets impacted (e.g., final EIS/EIR, appendix N2, table 6.D).

The FWS rejects the optimistic RBV estimates of Ralph et al. in the Draft SYP/HCP as well as the more pessimistic appraisals of Carter and Nelson, respectively. Instead, we conclude the total number of murrelets actually impacted will be smaller than the proportion suggested by the acres of known or likely occupied habitat that will be removed within the Bioregion. Even though about 35 percent of the estimated occupied habitat on the ownership is proposed for harvest, the proposed action should protect substantially more than 65 percent of the murrelets on the ownership (including Headwaters acquisition area) because of anticipated higher murrelet densities in the higher quality reserve areas (P. Karieva, pers. comm., December 7, 1998). Likewise, less than 22 percent of the murrelets in the Bioregion will probably be adversely affected by the proposed action.

Murrelet densities in California's redwood zone probably differ from densities in the habitat types in Oregon and Washington and may be higher if gross detection levels are a reliable indicator. Approximately 3.6 percent of the likely occupied habitat in Recovery Zone 4, and 0.67 percent of the likely occupied habitat in the listed range will probably be adversely affected by the proposed action, but the FWS has no quantitative data or method to further estimate the percentage of murrelets impacted at the level of the Recovery Zone or listed range.

After careful consideration of the best available information, including recent materials provided by PALCO and by interested members of the public, the FWS expects that the proposed action will adversely affect the species but will nevertheless protect an adequate number of murrelets to help maintain a viable subpopulation in Recovery Zone 4. The great majority of the remaining occupied habitat throughout the Zone and listed range is protected on Federal lands or through other HCPs and is therefore not likely to decrease from future timber harvest to any significant degree. The take of murrelets associated with the harvest of the proposed amount of mostly low to moderate quality habitat will not appreciably reduce the likelihood of the species' survival and recovery when viewed in conjunction with the long term preservation of the high quality habitat in the acquired Headwaters reserve, the MMCAs, on nearby public lands, and throughout the listed range,

Effect of the Action on Murrelet Reproduction: The proposed action uses the best available science to identify for preservation the highest quality habitat that likely has the highest rates of reproductive success, while identifying areas that have lower rates of productivity for potential

harvest (Marbled Murrelet Recovery Team, pers. comm., November 30, 1998, P. Karieva, pers. comm., December 1 and 7, 1998). Similar to the effect on murrelet numbers described above, the proposed harvest will have an adverse effect on reproduction for some number of murrelets likely to be less than 35 percent of the total numbers on the PALCO ownership. Most of these adversely affected murrelets will not be directly killed, but their reproductive opportunities will be eliminated or significantly reduced due to removal of their nesting habitat. Some percentage of displaced murrelets may successfully settle in other uncut habitat, but due to issues of site fidelity, predation, and intraspecific competition for nest sites, this percentage is likely to be small.

An impact to reproduction of murrelets associated with the harvest of this amount of mostly low to moderate quality habitat will not impact the reproductive capacity of murrelets to such an extent that the proposed action will appreciably reduce the likelihood of the species' survival and recovery, especially when viewed in conjunction with the long term preservation of the high quality habitat in the Headwaters reserve, in the MMCAs, on nearby public lands, and throughout the listed range under the Northwest Forest Plan. It is expected that murrelet nesting densities and reproductive success will eventually increase within the reserve areas due to improving habitat conditions within the permit period.

Effect of the Action on Murrelet Distribution: The proposed action will lead to the removal of occupied habitat on PALCO lands and will reduce the distribution of the murrelet in certain localized portions of the ownership, especially in the southern part of PALCO lands. However, by establishing the MMCAs and the Headwaters reserve, the proposed action adequately maintains distribution of murrelets on the ownership and in the bioregion (Marbled Murrelet Recovery Team, pers. comm., November 30, 1998). The reduction in distribution of murrelets on certain portions of PALCO lands will not appreciably reduce the likelihood of the species' survival and recovery when viewed in conjunction with the long term maintenance of distribution in the Headwaters reserve, in the MMCAs, on nearby public lands, and elsewhere throughout the listed range.

Marbled murrelet critical habitat The proposed action would bring over 70 percent of the timber stand acreage with primary constituent elements in CHU-03 a into the acquired Headwaters Reserve and MMCAs. These reserves would contain all of the best quality habitat uncut old growth redwood habitat existing within the CHU, which would be aggregated with residual habitat and late seral forest to protect the great majority of the existing conservation value in the CHU. The critical habitat left outside the reserves constitutes about 1.1 percent of the critical habitat in Conservation Zone 4 and about 0.3 percent of the critical habitat in the 3-state range. Almost 1/3 of the critical habitat left unprotected by the murrelet strategy would have some degree of protection in RMZs. The habitat being unprotected is primarily of lower quality, so the proportional effect on the CHU is lower than indicated by simple quantitative comparison of habitat removed versus habitat preserved. While there would be some adverse effects to critical habitat at the local level, the function of CHU-03 in providing breeding habitat would be retained. Therefore the effects on critical habitat would not appreciably reduce the value of critical habitat for the survival and recovery of the species.

Western snowy plover

The FWS concludes that the SYP/HCP may affect, but is not likely to adversely affect, the western snowy plover. This conclusion is based on the following: limited potential for impacts to the western snowy plover from activities to be covered under this SYP/HCP; the species conservation measures prescribed in the SYP/HCP; and the information available about the western snowy plover in the vicinity of the project. Currently, the known distribution of the species does not include any habitat under the ownership or vested rights of PALCO. Therefore, no adverse effects to the species from proposed activities are anticipated. Should the species expand its range to include portions of Eel River gravel bars under PALCO ownership or vested rights, conservation measures are established in the SYP/HCP to provide protection to breeding pairs. Should PALCO acquire lands or vested rights in the future on portions of the Eel River within the nesting range of snowy plovers at that time, protocol surveys will be conducted to locate nest locations, and nest protection measures in place at the time will be implemented to minimize the risk of adverse impacts to the species.

Implementation of the SYP/HCP is not anticipated to result in changes to the topography, substrate, or overall function of gravel bars on the Eel River. Thus no significant modification of suitable habitat of this species is anticipated. Long-term impacts of future gravel extraction operations (to be covered under separate permit and consultation) will be considered during the first 3 years of the implementation of this SYP/HCP.

Southern Oregon/Northern California Coast ESU coho salmon

The NMFS concludes that the proposed action may affect and is likely to adversely affect coho salmon in the SONCC ESU. The response of SONCC coho salmon to the proposed action over the 50-year period is assessed and described in relation to essential habitat features in the Effects Common to Pacific Salmonid section. The NMFS concludes that implementation of the aquatic conservation plan and its interrelated strategies will maintain or achieve, over time, properly functioning aquatic habitat conditions, thereby resulting in the long term survival of coho salmon in the SONCC ESU.

PROPOSED SPECIES:

Southern Oregon and California Coastal ESU chinook salmon

The NMFS concludes that the proposed action may affect and is likely to adversely affect SOCC chinook salmon in the SOCC ESU. The response of SOCC chinook salmon to the proposed action over the 50-year period is assessed and described in relation to essential habitat features in the Effects Common to Pacific Salmonid section. The NMFS concludes that implementation of the aquatic conservation plan and its interrelated strategies will maintain or achieve, over time, properly functioning aquatic habitat conditions, thereby resulting in the long term survival of chinook salmon in the SOCC ESU.

Southern Oregon/Northern California Coho salmon critical habitat

The NMFS concludes that the proposed action may affect proposed critical habitat for coho salmon in the SONCC ESU. The aquatic conservation plan will provide for the essential habitat elements necessary for the long term survival of coho salmon.

Chinook salmon critical habitat

The NMFS concludes that the proposed action may affect proposed critical habitat for chinook salmon in the SOCC ESU. The aquatic conservation plan will provide for the essential habitat elements necessary for the long term survival of coho salmon.

UNLISTED SPECIES:

Bank swallow

The proposed action is not likely to adversely affect the bank swallow because the species is not known to occur in the action area and conservation measures will minimize potential impacts on any newly discovered colonies.

Pacific fisher

The proposed action may affect and is likely to adversely affect the Pacific fisher. Covered activities have the potential to directly kill or injure fishers, and may disrupt breeding, feeding, and sheltering, behavior of fishers. Pacific fisher are expected to decrease by some unknown number in the action area due to a reduction and fragmentation of LSH.

The PALCO lands constitute a relatively small proportion of the range of the Pacific fisher. Historic records and recent surveys indicate that coastal redwood forests are apparently low quality habitat for fishers compared to more inland Douglas-fir and mixed conifer forests. It is currently unknown if a sustainable population of Pacific fishers exists within the Coastal Province of Northern California.

Late-seral habitat is considered the highest quality habitat for Pacific fishers on PALCO lands. The amount of LSH is expected to be substantially reduced and fragmented within the ownership. Although several patches of LSH greater than 80 acres in size will be retained on the ownership, patches greater than 475 acres in size will only be retained in the Humboldt and Yager WAAs throughout the permit period. In addition to LSH, coniferous and montane hardwood coniferous habitats typed as CWHR 4D that contain structural components used by fishers for rest and den sites may provided additional resting and denning habitat.

Although the amount of LSH on PALCO lands will be limited at the end of the permit period in the Eel River WAA, State park lands in this WAA are expected to provide large blocks of LSH. The resultant conditions on the PALCO ownership and adjacent public lands at the end of the permit period, in comparison to the **Conservation needs** of the species, are expected to contribute moderately to a sustainable population in the Coastal Province of Northern California, assuming a sustainable population currently exists. Although suitable foraging habitat would be maintained in adequate quantities within all five of the major WAAs, higher quality resting and denning habitat (i.e., LSH) would not be maintained in an adequate quantity, quality, and

distribution on PALCO lands. Special habitat components important to fishers will be retained and recruited across PALCO lands in amounts similar to those recommended in the **Conservation needs** identified for this species, and dispersal corridors between patches of LSH within and adjacent to PALCO lands will be provided by RMZs and CMZs. Although road densities on PALCO lands are much higher on average than those recommended in the **Conservation needs** for this species, most of the dirt logging roads on PALCO lands are closed to the public and are expected to maintain a moderate canopy cover.

Red tree vole

The proposed action may affect and is likely to adversely affect the California red tree vole. Covered activities have the potential to directly kill or injure red tree voles, and may disrupt breeding, feeding, and sheltering, behavior of voles. Increased fragmentation of LSH could result in increased predation of red tree voles.

Late-seral habitat is considered the highest quality habitat for red tree voles on PALCO lands. The amount of LSH is expected to be substantially reduced and fragmented within the ownership over the permit period. Although several patches of LSH greater than 80 acres in size will be retained on the ownership, patches greater than 475 acres in size will only be retained in the Humboldt and Yager WAAs throughout the permit period. In addition to LSH, coniferous and montane hardwood coniferous habitats typed as CWHR 4D which contain structural components used by red tree voles may provide additional lower quality habitat.

Although the amount of LSH on PALCO lands will be limited at the end of the permit period in the Eel River WAA, State park lands in this WAA are expected to provide large blocks of LSH. The resultant conditions on the PALCO ownership and adjacent public lands at the end of the permit period, in comparison to the **Conservation needs** of the species, suitable nesting and dispersal habitat would be maintained in an adequate quantity, quality, and distribution to allow a reduced population to persist on the ownership. Habitat conditions would be stable for a limited number of occupied sites, principally within MMCAs. Special habitat components which have the potential to provide suitable nest sites will be retained and recruited throughout the PALCO ownership. Dispersal corridors between patches of LSH within and adjacent to PALCO lands will be provided by RMZs and CMZs.

The proposed action includes effectiveness monitoring and adaptive management for this species. This process will help meet the additional research needs identified in the **Conservation needs** section of this document. The determination of non jeopardy for the California red tree vole is based in part on the expectation that potential changes to conservation measures identified during effectiveness monitoring conducted within years 2 to 7 of the permit will be implemented.

Response common to the northern red-legged and foothill yellow-legged frogs, and the northwestern pond turtle

The SYP/HCP includes riparian protection measures that exceed current CFPR. By the end of the 50 year period, the development of younger and residual stands within RMZs should improve the condition of aquatic habitat. As a result of riparian protection measures, it is assumed these species and subspecies would remain generally distributed throughout the PALCO ownership, occurring in suitable habitat in and adjacent to Class I and Class II streams, and wetlands. Riparian buffers do not provide maximum protection for the species and subspecies, but do reduce the degree of adverse impacts associated with timber harvest. Further fragmentation of forested habitat adjacent to suitable aquatic habitats will limit localized availability of suitable wintering and foraging or nesting habitat, and may lead to localized extirpations of these species' and subspecies' populations on the ownership.

The SYP/HCP includes longer term protection measures that may be developed and enacted through the site-specific watershed analysis processes. All parties to the SYP/HCP are required to adhere to the intent of the process, which is to conserve the included species. As elements of uncertainty are brought into sharper focus through monitoring and research, the relevant information will be incorporated, as needed, into management practices through the watershed analysis process. The FWS expects that improvement of the RMZs will be examined in depth through the watershed analysis and monitoring review processes. The FWS also expects that the proposed road management measures in the SYP/HCP (regarding construction, use limits, repair, and upgrades) should produce positive near term results, if applied diligently, as they will immediately remedy (or minimize) poor drainage conditions originating from road surfaces.

The FWS concludes that the ameliorating effects of the SYP/HCP aquatic provisions will not become apparent until younger stands in riparian areas mature further and become an effective source for instream coarse wood recruitment, and influences of sedimentation caused from past and recent harvest practices are reduced.

Northern red-legged frog

The proposed action would result in the loss of an undetermined number of individuals, potential reduced population size, and loss of recruitment into the population due to timber harvest of terrestrial habitat over a 50 year period.

Direct impacts to individuals may occur primarily outside the RMZs. Adverse impacts are likely to occur as a result of the loss or modification of 92,668 to 126,814 acres. Additional habitat associated with 486 acres of mapped wetlands may be adversely affected. Timber harvest and associated activities may adversely affect foraging and overwintering habitat, and may decrease water quality adversely affecting egg masses. Over time, implementation of the aquatic conservation strategy should improve habitat conditions.

Given the range-wide distribution of the subspecies, the expected distribution of the subspecies on PALCO lands, and the relatively small proportion PALCO lands represents within the subspecies'

range, impacts on suitable habitat may result in short- and long-term localized extirpations, but the subspecies is expected to persist on the landscape.

Foothill yellow-legged frog

The proposed action would result in the loss of an undetermined number of individuals, potential reduced population size, and loss of recruitment into the population due to timber harvest of terrestrial habitat over a 50 year period. Aquatic breeding sites and adjacent terrestrial habitat used for foraging and overwintering are critical to maintaining populations of the foothill yellow-legged frog across the landscape. The paucity of data for the species may result in a substantial over-estimation of effects in the assumption of a worst case scenario.

Pre-project surveys are not required, therefore direct impacts to individuals may occur. Adverse impacts are likely to occur as a result of the loss or modification of 16,724 to 50,870 acres. Additional habitat associated with 486 acres of mapped wetlands may be adversely affected. Indirect effects will occur both in the terrestrial and aquatic environment. Timber harvest and associated activities may adversely affect foraging and overwintering habitat, and may decrease water quality adversely affecting egg masses. Over time, implementation of the Aquatic Conservation Strategy should improve habitat conditions.

This species is known to occur in altered habitats however, it is not understood how these altered environments may contribute to the long-term viability of this species. This species is also known to occur in systems profoundly affected by timber harvest, such as the proposed project. However, baseline information prior to this influence is not known, so the level of impact decades of harvest have on local populations is not known. The degree to which this species is prone to change when disturbed is not well understood. The species is assumed able to respond following some level of disturbance, as found in studies on the Trinity River and observations of yellow-legged frogs within the project area. The species is expected to persist on the landscape.

Northwestern pond turtle

The proposed action would result in the loss of an undetermined number of individuals, potential reduced population size, and loss of recruitment into the population primarily due to timber harvest of terrestrial habitat over a 50 year period. Aquatic basking sites and refugia, and adjacent terrestrial habitat used for breeding, foraging and movement between pools are critical to maintaining populations of the northwestern pond turtle across the landscape. The paucity of data for the subspecies may result in a substantial over-estimation of effects in the assumption of a worst case scenario.

Pre-project surveys are not required, therefore direct impacts to individuals may occur. Adverse impacts are likely to occur as a result of the loss or modification of 91,840 to 191,767 acres. Additional habitat associated with 486 acres of mapped wetlands may be adversely affected. Indirect effects will occur both in the terrestrial and aquatic environment. Over time, implementation of the Aquatic Conservation Strategy should improve habitat conditions.

The pond turtle would generally remain distributed throughout the PALCO ownership, occurring in suitable habitat in and adjacent to Class I and Class II streams, and wetlands. Turtles may be eliminated in some localized areas, principally upslope from aquatic habitats during the wintering period. However, if the amphibian and reptile module is implemented during the watershed analysis process as described, it is expected key areas and populations will be identified and appropriate mitigations will be implemented.

Tailed frog and southern torrent salamander

Based on the discussions above (primarily the sections on effects, and the landscape comparison for habitats in the action area), the FWS draws the following conclusions:

(1) Some of the effects of past management actions will persist for several decades. Of particular concern are the long term recruitment of instream LWD, and the sediment storage capability of Class II and III stream channels. Both processes are important in the long-term maintenance of habitats for both species.

(2) The ameliorating effects of the SYP/HCP provisions for RMZs will not become apparent until second-growth stands in riparian areas (approximately 55 percent of the entire RMZ landbase) mature further and become an effective source for instream CWD recruitment. In the interim, the FWS expects some near-term reductions in sediment yield resulting from the road management and mass wasting provisions; but it is expected that the magnitude of those reductions will not offset the background sediment influx in streams originating from surface erosion on recently harvested uplands.

(3) Desirable habitat features, especially coarse substrates, are produced, over time, through stream channel morphological processes which, in turn, are largely regulated by regular influxes of CWD into those channels. There is some concern, in the interim period, that instream CWD accretion via the RMZ's may not keep pace with instream CWD losses due to decomposition and wear. The result of this would be that desirable habitat features associated with this species may not be replaced as rapidly as they are being lost. This trend may not level-off or reverse itself for several decades, contingent on the rates of development in second-growth stands in the RMZ's.

(4) Using the same mechanisms as in (3), above, the FWS also expects to see a similar pattern with sediment influx into streams; that is, persistent effects from past management actions, followed by a leveling-off and eventual recovery, also linked to the rates of stand development in the RMZ's.

(5) The FWS recognizes that dense populations of both species can persist in those localized breeding sites that are relatively unaffected by past management actions. The FWS is unable, from existing data, to estimate the magnitude of the habitat and population losses over the life of the proposed SYP/HCP. However, we are able to make a "worst-case" estimate, for both species, of the amounts of remaining suitable habitat, and occupied suitable habitat, at the point in time when we believe that habitat loss will stabilize (approx. in the year 2043). The estimate requires two assumptions: (a) That remaining populations will be effectively "refuged" in stream

habitats classified as undisturbed by Wroble and Waters (1989) (including high-gradient reaches and geologically stable areas); and (b) That the 16.22 stream miles surveyed by Wroble and Waters (1989) are representative of PALCO's Class II streams. Based on these assumptions the following results would be expected: (a) tailed frog - 73.1 miles of stream reaches containing suitable habitat, of which 51.0 miles contain occupied habitat, and (b) southern torrent salamander - 80.4 miles of stream reaches containing suitable habitat, of which 23.8 miles would contain occupied habitat late in the permit period.

In light of what we know about the spatial distribution and genetic structure of the species, there will be continuing concern over the isolation of those breeding sites and over their future contributions in maintaining gene flow and viable populations throughout the PALCO ownership. However, the FWS concludes that the prospect for stabilizing and reversing the current habitat and population trends is good in the long term for both species. This view is based on two features of the SYP/HCP: First, on the strengths of the interim measures for road management, mass wasting prevention, and riparian management zones in the SYP/HCP; and second, on the mandated watershed analysis processes which provide an opportunity to further refine and improve management practices on a site-specific basis.

The FWS finds that this action will not jeopardize the continued existence of either species. The basis for the finding is related to the population structure of both species in the context of land allocation across the entire species range. We know that substantial portion of both species range are under Federal management (56% of the tailed frog range and 37% of the southern torrent salamander range). Much of this federal land is in reserved or quasi-reserved status (69% of the Federal landbase for both species), and all activities are subject to the riparian guidelines of the Northwest Forest Plan. It is probable that viable populations of both species can be maintained on the Federal lands. Against this background, we also know that the species is a metapopulation, made up of highly sedentary subpopulations. In this light, we conclude that even the worst-case scenario for intensively managed private lands would not appreciably jeopardize the outlook for habitat and population recovery on the Federal lands.

Northern California ESU steelhead

The NMFS concludes that the proposed action may affect and is likely to adversely affect steelhead in the ESU. The response of steelhead to the proposed action over the 50-year period is assessed and described in relation to essential habitat features in the Effects Common to Pacific Salmonid section. The NMFS concludes that implementation of the Aquatic Conservation Plan and its interrelated strategies will maintain or achieve, over time, properly functioning aquatic habitat conditions, thereby resulting in the long term survival of steelhead in the ESU.

Southern Oregon/California Coasts ESU coastal cutthroat trout

The NMFS concludes that the proposed action may affect and is likely to adversely affect coastal cutthroat trout in the SOCC ESU. The response of SOCC coastal cutthroat trout to the proposed action over the 50-year period is assessed and described in relation to essential habitat features in the Effects Common to Pacific Salmonid section. The NMFS concludes that

implementation of the Aquatic Conservation Plan and its interrelated strategies will maintain or achieve, over time, properly functioning aquatic habitat conditions, thereby resulting in the long term survival of coastal cutthroat trout in the SOCC ESU.

CUMULATIVE EFFECTS

The Services must consider both the effects of the proposed action and the cumulative effects of other activities in determining whether the action is likely to jeopardize the continued existence of a covered species or result in the destruction or adverse modification of critical habitat. Under the Act, cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in the biological and conference opinions. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The FWS and NMFS believe that listed species and other covered species may be affected by numerous actions by State, tribal, local, or private entities that are reasonably certain to occur in the action area. These actions include, but may not be limited to, those discussed below. Although each of the following actions may reasonably be expected to occur, we lack definitive information on the extent or location of many of these categories of actions. The following discussion provides available information on the expected effects of these activities on covered species. Section 9 of the Act prohibits take of fish and wildlife species listed under the Act, unless authorized by ITPs. Take of State listed species is also prohibited under CESA. In addition to the Act and CESA, other laws regulating certain of these activities provide protections for some covered species, especially the Federal Clean Water Act, the CEQA, the California Fish and Game Code, and the CFPRs. Most of these protections do not apply specifically to those species covered by the permit that are not currently listed; however, they would apply should such species become listed in the future. Enforcement of existing law is expected to minimize the impacts of these activities on listed species, and to a lesser extent, to covered species that are not listed.

Approval of the subject SYP/HCP by agencies of the State of California
The Services anticipate that the SYP/HCP will be approved by the CDF and CDFG. Because the approval of the SYP/HCP by agencies of the State is subject to the CESA and CEQA, which require, respectively, determinations regarding avoidance of jeopardy to listed species and mitigation of significant effects, and because the documents under consideration by the State are the same as those being evaluated herein, the Services do not anticipate that approval of the SYP/HCP by the State agencies will result in cumulative effects that exceed those evaluated elsewhere in this biological opinion.

Timber management
Timber management, with associated activities such as harvest, yarding, loading, hauling, site preparation, planting, vegetation management, and thinning, is the dominant human activity in the action area. Future timber harvest levels in the action area cannot be precisely predicted,

however, it is assumed that harvest levels on private lands in Humboldt County in the foreseeable future will be within the approximate range of harvest levels that have occurred since the listing of the northern spotted owl in 1992. Based on data for recent years, the annual harvest level in Humboldt County is expected to be about 500 MMBF (California Board of Equalization 1998).

Information on past THPs have only been collected in three watersheds within the action area, refer to the **Environmental baseline common to all species** (California Department of Forestry and Fire Protection 1999). Using this information, we can predict only rough estimates of future harvest levels within the action area, outside of PALCO's ownership. In the past 12 years, within the Eureka Plain Calwater watershed (123,533 acres total) and excluding PALCO land and the Headwaters Forest, 15,071 acres have been included within approved THPs and an additional 90 acres are within pending THPs. In the past 16 years, within the Mattole River Calwater watershed (52,862 acres total), excluding PALCO land, 4,502 acres have been included within approved THPs, with an additional 349 acres within pending THPs. In the past 12 years, within the Scotia Calwater watershed (12,813 acres total), excluding PALCO land, 329 acres have been included within approved THPs. We assume that this level of THP approval is similar in other watersheds within the action area, and that this level of THP approval will continue in the future. It is assumed that this harvest will occur subject to the CFPRs, Act, and CESA, and thus that take of listed species will be either avoided or conducted according to SYP/HCPs and ITPs. The Services are aware of two other industrial timber companies with property within the action area that have expressed interest in HCPs for listed and unlisted species. Eventual approval of those HCPs would be evaluated under the Act and CESA and take into account effects of approval of PALCO's ITPs.

Implementation of THPs under the CFPRs has not consistently provided protection against unauthorized take in relation to Pacific salmonids listed under the Act by the NMFS, such as coho salmon. The NMFS has informed the CDF of its ongoing concern over the lack of specific provisions for Pacific salmonids in the CFPRs. In April 1997, the CDF issued the document *Coho salmon considerations for timber harvesting under the CFPRs* as guidance to foresters on how to address take of coho salmon. Although this document provides guidance for protecting salmonids, it does not, in many instances, require measures that would avoid take of coho salmon from direct, indirect, and cumulative effects. Discussions continue on this issue between the NMFS, CDF, and California Resources Agency. Until these issues are resolved, unauthorized take from direct, indirect, and cumulative effects of coho salmon from timber harvest and its associated activities may be occurring. The extent and amount of any unauthorized take of coho salmon is unknown.

Reasonably foreseeable effects of timber management activities may also impact designated critical habitat for the marbled murrelet on private lands within the action area. This effect would potentially occur due to private timber harvest on about 7,766 acres outside of PALCO lands that are within the boundaries of critical habitat unit CA-03-a.. The number of acres that contain primary constituent elements of critical habitat within this 7,766 acres is unknown. Designated critical habitat only exists in stands which contain the following primary constituent elements: 1)

potential nest trees and 2) one-half site potential tree height stands within 0.5 mile of potential nest trees. Timber harvest could effect critical habitat only to the extent that harvested acres qualify for designation. Where this habitat is directly adjacent to occupied habitat, it is subject to take avoidance measures of the CFPRs, so impacts there are expected to be minimized by those regulations.

Reasonably foreseeable effects of timber management activities may also impact proposed critical habitat for the coho salmon and chinook salmon. An undetermined number of miles of fish bearing streams are on private land outside of PALCO ownership but within the action area. It is expected that these Class I waters would be provide some or all of the essential habitat features of proposed critical habitat. Within the action area, direct, indirect, and cumulative effects of timber harvesting on lands outside of PALCO ownership may degrade the habitat features identified as essential for proposed coho and chinook salmon critical habitat. These effects are expected to be similar to the effects of the covered activities on PALCO's ownership, therefore refer to the aquatic effects section for details on how timber harvesting activities effect the essential habitat features for proposed coho and chinook critical habitat. The extent of the effect to proposed critical habitat is unknown given the uncertainty of protective measures in THPs.

Control of wildfires

The CDF, in conjunction with other State or Federal agencies, may be involved in the control of wildfires. Control measures may include the use of helicopters, aircraft, or other noise-generating equipment at various times of the year. These activities may result in the disturbance of covered species during the breeding season. An undetermined number of individuals may be affected by this activity on an annual basis each year of the permit period.

In addition, control of wildfires may include the removal of modification of vegetation due to the construction of firebreaks or setting of backfires to control the spread of fire. An undetermined amount of suitable habitat for covered species may be removed or modified by this activity. During the past 10 years, an undetermined number and acreage of fires have occurred in the action area.

Industrial activities, sawmills, and associated activities

Most sawmills located in the project area are expected to remain in operation for the foreseeable future, based on a relatively steady supply of timber, as discussed above. The reduction in available old-growth logs will probably result in closure or retooling of those mills designed to process large logs. Facilities are expected to operate within applicable laws. Where waste water discharge may affect habitat for listed species, it is expected that the Act and the CESA will be enforced. Further large-scale industrial development is not anticipated, but if such development should occur, it is expected that all applicable laws will be applied.

Construction, reconstruction, maintenance, and use of roads

While the level of construction of new roads and reconstruction of old roads on private and state lands cannot be anticipated, it is expected to continue at a pace similar to the current pace. The

increased emphasis on protection of aquatic resources is expected to result in higher standards for road construction, reconstruction, maintenance, and use as compared to historical standards. Improvement of environmental conditions related to roads throughout the action area is expected over the long term. Noticeable improvements in the short term are unlikely due to a projected increase in the number of road miles per square mile of land, the lack of comprehensive road standards, existence of numerous older ("legacy") roads within the action area, and lack of routine inspections and maintenance of existing roads. These trends will be especially noticeable on industrial timberlands.

Gravel mining, quarrying, and processing

The Services anticipate that river bar gravel mining, and upland quarrying and associated gravel processing, will continue to be conducted by non-Federal parities within the action area. Future demand for rock may increase with increased emphasis on road improvement on private timberlands and ranch lands to protect aquatic species. Eleven gravel operations are currently located along an eight-mile stretch of the lower Eel River, and two additional operations are located on the lower reaches of the Van Duzen River. These gravel operations are under the jurisdiction of Humboldt County, the California Coastal Commission (for those activities conducted within the Coastal Zone), and the COE. Section 7 consultation has been completed on the 13 gravel mining operations and they are not considered a cumulative effect. The incidental take statement associated with this section 7 consultation expires in 2001. The permitted annual level of rock extraction from upland quarries within Humboldt County is 720,000 cubic yards, although actual annual extraction is less. The actual degree of increase in demand cannot be predicted. Commercial rock quarrying will continue to be under the regulation of Humboldt County and the California Coastal Commission (for those activities conducted within the Coastal Zone). If the jurisdiction of the COE over river bar gravel mining is not retained in the future, it is anticipated that the agencies will continue to be engaged in protection of listed species under the Act and CESA.

The effect on covered species from the commercial rock operations in the action area is expected to be similar to that described under the aquatics effects section. The effects of quarries and rock mines on aquatic resources depend on the type of mining, the size of the quarry or mine, and distance from waters. Rock mining can cause increased sedimentation, accelerated erosion, increased streambank and streambed instability, and changes to substrate. Surface mining may result in soil compaction and loss of the vegetative cover and humic layer, increasing surface runoff. Mining may also cause the loss of riparian vegetation. Chemicals used in mining can be toxic to aquatic species if transported to waters. Because the effects of quarries and rock mines depends on several variables, the effects of quarries and other commercial rock operations within the action area on covered species are unknown. Commercial rock quarrying will continue to be under the regulation of Humboldt County and the California Coastal Commission (for those activities conducted within the Coastal Zone).

Stream restoration projects

It is anticipated that, as monitoring information accumulates on past projects, the focus of stream restoration projects will gradually shift toward more effective restoration actions. Because such activities are usually coordinated with one or more of the resource agencies, it is anticipated that all applicable laws will be followed. Restoration activities conducted through CDFG's Fisheries Habitat Restoration Program authorized take of coho salmon through a section 7 consultation with the COE, and are therefore not considered a cumulative effect. Restoration activities that are not conducted pursuant to CDFG's program may cause temporary increases in turbidity, alter channel dynamics and stability, and injure or scare salmonids if equipment is used in the stream during restoration projects. Properly constructed stream restoration projects may increase habitat complexity, stabilize channels and streambanks, increase spawning gravels, decrease sedimentation, and increase shade and cover for salmonids. It is unknown how many restoration projects are completed outside of CDFG's program, therefore the effects of these projects cannot be predicted.

Agricultural activities
Agricultural activities including grazing, dairy farming, and the cultivation of crops.
The recent upward trend in value of dairy-related agricultural products (e.g., milk, cows and calves, pasture, hay, and silage) in Humboldt County is expected to continue as human populations continue to increase (U. S. Department of Agriculture 1998; G. Markegard, pers. comm., January 29, 1999). As a result, the dairy industry in the project area, primarily in the lowlands of the Eel River watershed below the PALCO ownership, is expected to persist. Impacts on water quality would be expected to be regulated under applicable laws.

The impacts of this use on aquatic species is anticipated to be locally intense, but the longevity of the impact depends on the degree of grazing pressure on riparian vegetation, both from dairy and beef-cattle. Grasses, willows, and other woody species can recover quickly once grazing pressure is reduced or eliminated (Platts 1991) through fencing, seasonal rotations, and other measures. Assuming that appropriate measures are not taken to reduce grazing pressure, impacts to aquatic species are expected to increase with the predicted continuation or increase in grazing. Anticipated impacts include decreased bank stability, loss of shade- and cover-providing riparian vegetation, increased sediment inputs, and elevated coliform levels.

Residential development and operation of existing residential infrastructure
The moderate rate of human population growth in Humboldt County (about 2.8 percent increase from 1995 through 1998) and the three north coastal counties (about 3.3 percent overall increase from 1995 through 1998) (California Department of Finance 1997, 1998a, 1998b) is expected to continue. In Humboldt County, most of this growth is expected to occur near the cities of Eureka, Arcata, and McKinleyville, to the north of the project area, while growth in the communities of the project area, including the towns of Carlotta, Fortuna, and Scotia, is expected to be low (J. Baskin, pers. comm., January 29, 1999). Conversion to residential uses of lands zoned for forest production is expected to continue at a similar or slightly slower rate than in the recent past (J. Baskin, pers. comm., January 29, 1999). However, some large timberland owners, such as Simpson, have recently expressed increased interest in conversions of land from forest

production to other uses (J. Baskin, pers. comm., January 29, 1999). Impacts on water quality related to residential infrastructure would be expected to be regulated under applicable laws.

Once development and associated infrastructure (roads, drainage, etc) are established, the impacts to aquatic species are expected to be permanent. Anticipated impacts to aquatic resources includes loss of riparian vegetation, changes to channel morphology and dynamics, altered watershed hydrology (increased storm runoff), increased sediment loading, and elevated water temperatures where shade-providing canopy is removed. The presence of structures and/or roads near waters may lead to the removal of LWD in order to protect those structures from flood impacts. The anticipated impacts to aquatic covered species from continued residential development are expected to be sustained and locally intense, but, given the predicted slow growth rate development within the action area, impacts are not expected to increase substantially over current levels.

Human recreation, including hiking, camping, fishing, and hunting
Because most of the project area is private land, most outdoor recreational activities would be expected to be confined to state and county parks, except at scattered fishing access points along major streams. Visitation to HRSP has been slowly increasing in recent years; this trend is expected to continue as the human population of the area increases. Planning is currently underway to increase visitor facilities at HRSP, and these new facilities are expected to be fully utilized by the public (K. Wilbur, pers. comm., January 29, 1999). The potential for human disturbance of wildlife populations, and especially the encouragement of avian scavenger/ predators by human presence, would be expected to also increase (K. Anderson, pers. comm., January 29, 1999). However, the California Department of Parks and Recreation has indicated willingness to implement programs to reduce this effect, and discussions have begun with the CDFG and FWS.

Expected recreation impacts to salmonids include increased turbidity, impacts to water quality, barriers to movement, and changes to habitat structures. Streambanks, riparian vegetation, and spawning redds can be disturbed wherever human use is concentrated. Campgrounds can impair water quality by elevating coliform bacteria and nutrients in streams. Construction of summer dams to create swimming holes causes turbidity, destroys and degrades habitat, and blocks migration of juveniles between summer habitats. Impacts to salmonid habitat are expected to be localized, mild to moderate, and temporary. Fishing within the action area, typically for steelhead or coastal cutthroat trout, is expected to continue subject to the California Fish and Game Code. The level of take of Pacific salmonids within the action area from angling is unknown, but is expected to remain at current levels.

Water withdrawals
An unknown number of permanent and temporary water withdrawal facilities exist within the action area. These include diversions for urban, agricultural, commercial, and residential use, along with temporary diversions, such as drafting for dust abatement. Due to the anticipated slow urban/residential growth within the action area and the expected increase in agriculture (dairy

farming), the number of diversions and amount of water diverted is expected to increase gradually within the action area. Impacts to salmonids are expected to include entrapment and impingement of younger salmonid life stages, localized dewatering of reaches, and depleted flows necessary for migration, spawning, rearing, flushing of sediment from the spawning gravels, gravel recruitment, and transport of large woody debris. Water diversions are expected to be conducted under applicable laws, including the Act, California Fish and Game Code, and Clean Water Act.

Chemical use

It is anticipated that chemicals such as pesticides, herbicides, fertilizers, and fire retardants will continue to be used within the action area. Chemical application is under the jurisdiction of several Federal, state, and local agencies and their use is expected to be conducted under applicable laws. The effects of these chemicals on salmonids is expected to be similar to the effects described in the *Interrelated and interdependent effects* section of this Opinion.

CONCLUSION

LISTED SPECIES/CRITICAL HABITAT:

After reviewing the current status of each covered species, the environmental baseline for the action area, the effects of the proposed action (i.e., *Headwaters Forest Acquisition and the PALCO SYP/HCP*), and the cumulative effects, it is the Services' biological and conference opinion that the action as proposed, is not likely to jeopardize the continued existence of any covered species for reasons below.

In addition, the action as proposed, is not likely to destroy or adversely modify designated critical habitat for the marbled murrelet or proposed critical habitat for coho and chinook salmon. No critical habitat has been designated for the bald eagle, therefore, none will be affected. Critical habitat for the northern spotted owl and American peregrine falcon have been designated either outside the action area (i.e., peregrine falcon) or inside the action area but outside of PALCO lands (i.e., northern spotted owl); however, this action does not affect these areas and no destruction or adverse modification of these critical habitats is anticipated.

Justifications for the findings of no jeopardy of the covered species and no destruction or adverse modification of critical habitat are summarized as follows:

American peregrine falcon

Adverse effects to the peregrine falcon may occur in the form of disturbance from activities not associated with timber harvest within 0.5 miles of 3 known nest sites and an unknown number of potential nest sites. In addition, some unknown degree of adverse impacts may be experienced by the species due to changes in habitat for peregrine falcon prey species from forest seral stage changes following timber harvest and stand management activities. These adverse effects are expected to be minor in extent, but may result in the take of one or more peregrines during the 50 year life of the proposed action. However, current population levels of peregrines are at or above recovery goals at both the regional (California, Oregon, Washington and Nevada) level and the range-wide level (that is, for each of the recovery regions throughout the range of the species). In

addition, productivity goals identified in each of the regional recovery plans has been met or exceeded. Although egg shell thinning continues to be a concern in some portions of the species' range, current levels have not precluded achieving productivity goals. The species has been proposed for delisting by the FWS based on the attainment of these recovery goals. The proposed project does not result in DDT or its metabolites being released into peregrine habitats. Availability of suitable habitat has not been identified as a major limiting factor for this species. Conservation measures implemented under the proposed project are designed to minimize any adverse effects from disturbance-related impacts associated with covered activities.

Northern spotted owl

Most conservation needs of the spotted owl would be met. Conservation needs include a cluster of more than 20 activity centers supported by habitat conditions which meet the breeding, feeding, roosting, cover, and dispersal needs of the species. Habitat conditions should be stable and allow interaction between individuals.

The proposed action would result in habitat conditions which support at least 108 activity centers throughout the 50-year period, a reduction of 31 percent from the current level of 156 activity centers. The resultant population would exceed the conservation goal of 60 activity clusters in the southern part of the regional area. Owls would occur well distributed throughout the ownership and be capable of dispersing and interacting with other owls in the action area. The amount of suitable habitat would increase slightly during the permit period, after an initial decline. Population levels and reproduction would be monitored and measures taken to develop and implement new protection measures if population and reproduction goals are not met. Stable or improving conditions would be maintained some sites, mostly in MMCAs, the Headwaters Reserve, and activity centers afforded Level One protection measures.

Bald eagle

The conservation needs of the species should be met if nesting or wintering eagles are detected. The conservation needs of the bald eagle include: conservation of habitat to meet its breeding, roosting, cover, and wintering needs; and protection from disturbance.

The proposed action would not affect the number, distribution, or reproduction of known nest sites, since nests do not occur on PALCO lands. The likelihood of bald eagles nesting in substantial numbers on the PALCO lands is low, based on a small nesting population in the regional area. If detected, conservation measures are adequate to maintain the integrity of nest sites and reduce disturbance of nesting pairs or wintering eagles. The role of PALCO lands probably is limited to supporting a small wintering population. Recovery goals have been met or exceeded in the recovery unit.

Marbled murrelet

After reviewing the current status of the marbled murrelet, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the murrelet and is not likely to destroy or adversely modify critical habitat.

This conclusion is based on the following major findings:

1. The proposed action is designed to maintain a viable murrelet population on PALCO lands (including the Headwaters acquisition area) by targeting most harvest to lower quality residual redwood stands while preserving large amounts of the highest quality habitats in multiple reserves.

   a. 91 percent of the highest quality unentered old-growth redwood will not be harvested.

   b. 50 percent of the likely occupied residual old-growth redwood will not be harvested; this reserved residual habitat is higher quality overall than the residual habitat targeted for harvest.

   c. This conserved habitat will be maintained in large, long term reserves that will improve during the permit period due to development of second growth forest within or adjacent to the old growth habitat in the reserves.

2. It is estimated that the proposed action will remove approximately 21.7 percent of the likely occupied habitat in the Bioregion, 3.6 percent in Recovery Zone 4, and 0.67 percent in the listed range. Within the Bioregion the actual impact to the murrelet population is likely to be smaller than the percentage represented by this area estimate, because murrelets are probably nesting in high densities and with greater success in the higher quality reserve areas compared to the proposed harvest areas. Due to a lack of data on murrelet nesting densities the FWS is unable to predict what precise percentage of the Zone or listed range populations will be impacted, but occupied area estimates suggest these percentages will be very small.

3. Based on the conservation principles described in this opinion, the MMCA and Headwaters reserve areas are expected to function in conjunction with other murrelet HCPs and the reserves on Federal lands to stabilize and eventually recover the declining murrelet population. The FWS believes that the MMCAs, the Headwaters stand, and nearby State Parks protect most of the breeding murrelets and have a reasonable likelihood of maintaining a viable subpopulation in the Bioregion. Likewise, this MMCA/Headwaters/State Park network in the Bioregion will function in conjunction with National Park, State Park, and other Federal lands in California and southern Oregon to maintain a viable population in Recovery Zone 4. Finally, this population in Zone 4 should function with other protected Federal lands under the Northwest Forest Plan and other HCPs in California, Oregon, and Washington to support a viable, well-

distributed murrelet population throughout the listed range. Multiple discrete protected areas of good quality habitat that are located throughout the listed range maintain a high probability of the listed population surviving chance events such as oil spills, forest fires, and other catastrophes.

4. The proposed action would leave unprotected about 29 percent of the habitat with primary constituent elements within CHU-030a. This constitutes about 1.1 percent of the critical habitat in Conservation Zone 4 and about 0.3 percent of the critical habitat in the 3-state range. Almost 1/3 of the critical habitat left unprotected by the murrelet strategy would have some degree of protection in RMZs. The habitat being unprotected is primarily of lower quality, so the proportional effect on the CHU is lower than indicated by simple quantitative comparison of habitat removed versus habitat preserved. The acquired Headwaters Reserve and the MMCAS would contain all of the best quality habitat uncut old growth redwood habitat within the CHU, which would be aggregated with residual habitat and late seral forest to protect the great majority of the existing conservation value in the CHU. The function of CHU-03 in providing breeding habitat would be retained. Therefore the effects on critical habitat would not appreciably reduce the value of critical habitat for the survival and recovery of the species.

To fully understand why these conclusions are consistent with the overall Federal murrelet recovery strategy and previous biological opinions on the murrelet, the following information should be considered. The FWS's conservation strategy for murrelet breeding habitat consists of: (1) under the Northwest Forest Plan, protecting all occupied sites on all Federal lands and recruiting more suitable habitat in LSRs on USFS and BLM lands, and (2) protecting as much occupied habitat as possible on non-Federal lands while using HCPs to get long term protection and recruitment of habitat in sufficient amounts where Federal lands are lacking.

The FWS recognizes that the listed murrelet population may be in decline (USDI Fish and Wildlife Service 1997) and that the proposed action is adversely affecting the species by removing a relatively large amount of occupied and unoccupied suitable habitat. During the early phases of PALCO SYP/HCP development, the FWS rejected several less protective HCPs proposals from PALCO or their consultants (e.g., D. Murphy, September 10, 1997). The proposed final SYP/HCP represents a significant improvement from those earlier proposals (P. Karieva, December 1, 1998) and incorporates several recent recommendations made by the Marbled Murrelet Recovery Team (November 30, 1998).

The FWS also recognizes that the most conservative approach to managing non-Federal lands for the benefit of murrelets would be to protect all occupied murrelet habitat. This option was not a practicable alternative to PALCO and is not necessary to meet the criteria for issuance of a section 10(a)(1)(B) permit, which provides for the issuance of ITPs where the impacts of such

take are minimized and mitigated to the maximum extent practicable and where such take would not result in jeopardy to the covered species. Similar to previous murrelet HCP efforts, a site-specific plan was therefore needed that conserved as much occupied habitat as necessary to maintain a viable population in Recovery Zone 4, while allowing some harvest of other less valuable occupied habitat to address the applicant's needs. Although some take of occupied habitat could be permissible, the FWS maintained in multiple correspondence to the applicant and others that the Final SYP/HCP must be consistent with section 7 of the Act and could not appreciably reduce the likelihood of the murrelet's survival and recovery (see USDI Fish and Wildlife Service letters dated May 20, 1997, August 8, 1997, November 25, 1997).

During the planning stage for the proposed SYP/HCP, the FWS stressed to the applicant this need to maintain a viable subpopulation of murrelets in the SYP/HCP area, so that this subpopulation could in turn contribute to the maintenance of a viable Zone 4 population. The company convened a qualified and objective scientific panel (W. Murdoch, University of California, Santa Barbara; B. Noon, Colorado State University; P. Karieva, University of Washington; M. Cody, University of California, Los Angeles; M Raphael, USFS) and made several earnest attempts to develop analytical tools such as population viability analysis to precisely estimate how much PALCO habitat would be needed to increase the likelihood of maintaining viable subpopulation to acceptable levels (see R. Ackakaya in Draft SYP/HCP). Due to limited data and life history information for the marbled murrelet, this modeling effort provided limited usable results (Beissinger and Westphal 1998). The FWS, with input from the scientific panel, has therefore continued to rely on basic conservation principles in negotiating and evaluating this SYP/HCP (National Research Council 1995; Karieva, December 1 and December 7, 1998).

Similar to the conservation strategy adopted for the northern spotted owl under the Northwest Forest Plan (Raphael et al. 1996), the murrelet strategy is to conserve much of the remaining suitable and all occupied habitat on Federal lands to provide a system of long term management reserves — the so called "backbone" of the Recovery Plan (USDI Fish and Wildlife Service 1997, page 3). Like the spotted owl, the murrelet is believed to be in a population decline. These reserves, which for the murrelet are augmented on key non-Federal lands where Federal lands are lacking, are expected to stabilize and eventually recover the declining populations. The FWS expects that the protections on Federal lands combined with SYP/HCP protections on important State and private lands will function as intended and will maintain viable Zone populations as recommended in the Recovery Plan (USDI Fish and Wildlife Service 1997).

In Zone 4, the public acquisition of Headwaters and protection of the PALCO MMCAs for the permit period will protect the majority of the most important occupied forest stands on PALCO ownership (91 percent of unentered old growth redwood, and 50 percent of the higher quality residual redwood), while allowing mostly lower or medium quality habitat to be removed. Although the loss of the harvested habitat is a serious adverse affect that may impact 3.6 percent of the occupied habitat in Zone 4, these reserve areas are nevertheless expected to function with other important habitat in the Zone, such as Humboldt Redwoods State Park, the Redwood National Park/State Park complex, the Six Rivers National Forest, the Siskiyou National Forest,

and Coos Bay BLM lands to maintain a viable and well distributed murrelet population in this Zone.

This combination of multiple protected areas with good quality habitat that is well distributed should protect the Zone 4 population from stochastic or catastrophic events such as localized oil spills, shifting marine prey distribution, and forest fires. However, the FWS also recognizes that all species, whether healthy or declining, are always at some risk due to chance events. This risk can never be entirely eliminated even under the most favorable conditions — it can only be minimized to some acceptable level. The FWS believes this proposed action adequately minimizes this risk and will allow for the persistence of a viable murrelet population in Zone 4 and in the listed range.

The FWS has applied this same general management strategy with other Federal, State, private, and tribal landowners. The FWS has authorized the take of marbled murrelet occupied habitat as part of several other HCPs or Federal actions (see table 14 in the Environmental Baseline). These plans and the incidental take associated with them vary in degree and kind, reflecting local ecological conditions as well as differing landowner priorities. For example, the FWS authorized the harvest of up to 74,000 acres of potentially occupied habitat for the WDNR HCP. In contrast, the Weyerhaeuser Company declined to seek an ITP take permit for murrelets as part of its Millicoma Tree Farm HCP, instead agreeing to avoid taking murrelets when harvesting potentially suitable habitat on their lands. As these examples illustrate, these various landowners have different goals and strategies when managing murrelets on their lands, and the FWS attempts to work cooperatively with them to avoid jeopardy and achieve positive conservation gains.

The proposed action is also consistent with section 7 biological opinions addressing these HCPs and other Federal actions that affected murrelets. The FWS has issued two important biological opinions that determined proposed harvests of large amounts of known occupied murrelet habitat was likely to jeopardize the species. The first opinion (USDI Fish and Wildlife Service May 11, 1994; reinitiated biological opinion issued June 12, 1995) addressed the so called "section 318" timber sales on USFS lands. The second opinion addressed harvest in the North Boundary Unit on Quinalt Indian Nation lands (USDI Fish and Wildlife Service Jan. 28, 1998). It is worthwhile to review why these two Federal actions were determined likely to jeopardize the species, while the proposed PALCO SYP/HCP and Headwaters acquisition is not likely to jeopardize the species.

In the section 318 biological opinions (May 11, 1994, and June 15, 1995), the FWS concluded that the proposed harvest of 76 timber sales (originally totaling about 6,300 acres, subsequently modified to 57 sales totaling 4,300 acres of known or potential occupied habitat, or at least 119 occupied timber sale units) was likely to jeopardize the marbled murrelet. The primary impacts of this action that justified the jeopardy determination were: (1) the harvest of some of the highest quality old growth murrelet habitat remaining in Oregon and Washington, including important habitat on the Siuslaw National Forest termed the "stronghold" of the Oregon murrelet population; (2) the harvest of these sales would fragment and adversely affect an additional number of murrelets in adjacent, unbuffered high quality habitat; and (3) most of the sales (53 of

77) were located in LSRs, the "backbone" of recovery for the murrelet (USDI Fish and Wildlife Service 1997, page 3); harvest of occupied habitat in these sales was inconsistent with the Federal murrelet recovery strategy under the Northwest Forest Plan, which called for the protection of all occupied sites on Federal lands (Frampton, November 29, 1994; Henson, August 23, 1994).

The FWS also determined that the proposed North Boundary Area harvest on Quinalt Indian Nation lands was likely to jeopardize the murrelet (USDI Fish and Wildlife Service January 28, 1998). Of a total of 4,700 acres of high quality murrelet habitat in the North Boundary Area, the Tribe proposed to harvest approximately 3,100 acres and reserve 1,600 acres in riparian areas. The primary reasons for the jeopardy conclusion included: (1) the proposed action made no provision for the maintenance of the highest quality sites and instead would adversely affect murrelets on all 4,700 acres of the North Boundary Area -- including within riparian reserves -- due to habitat removal and fragmentation; (2) the action would remove between 12 and 21 percent of the high quality occupied habitat in Recovery Zone 2 (page 28); (3) this habitat is some of the highest quality and most productive habitat in Recovery Zone 2 and is likely "source" habitat from which reproductively successful murrelets are dispersing (page 25); and (4) the harvest would seriously impact murrelet distribution within Zone 2 by further widening the distributional gap in southwestern Washington (pages 27, 36). The FWS provided a reasonable and prudent alternative to this jeopardy action (page 37) that permitted the take of 1,125 acres (28 percent) of lower quality occupied habitat, while reserving approximately 2,850 acres of higher quality habitat (72 percent); this take, while an adverse impact to the species, was determined not likely to jeopardize the murrelet.

The proposed PALCO action is similar to these jeopardy actions in that it would harvest approximately 4,700 acres (minus what is protected in riparian reserves) of known or suspected occupied murrelet habitat; the section 318 sales totaled 6,300 acres, and the Quinalt action totaled 4,800 acres. However, the PALCO action is different from these actions in how it will affect the long term survival and recovery of the marbled murrelet. The section 318 timber sales would have had a significant adverse impact on Federal LSRs and would have been inconsistent with both the Northwest Forest Plan and the Recovery Plan. The impacted acreage was the highest quality old-growth murrelet habitat on all USFS lands in the listed range and was expected to have relatively high densities of successfully reproducing murrelets for Oregon and Washington. Adjacent acreage would not have been buffered from the harvest, so it is likely that the affected acres of occupied habitat would have been significantly higher than the total acres harvested. In contrast to this action, the PALCO action protects the majority of high quality habitat and it buffers the reserve areas.

Likewise, the proposed Quinalt action would have removed or adversely affected all 4,800 acres of habitat on the North Boundary Area ownership with no provisions for maintaining high quality habitat for murrelets. This habitat is some of the highest quality habitat in Recovery Zone 2, suspected to be an area that is successfully producing murrelets. In contrast, the PALCO SYP/HCP protects the majority of the local high quality habitat suspected to be areas of high productivity. Also, the Quinalt harvest would have significantly impacted the distribution of the Zone 2 population, while the PALCO SYP/HCP effectively maintains murrelet distribution in

Zone 4. Indeed, the Quinalt reasonable and prudent alternative to jeopardy follows an approach that is very similar to that of the PALCO action: protect most high quality sites, and target harvest to the lower quality occupied habitats that have less relative value to the species but still provide the landowner with some reasonable economic options.

In sum, these jeopardy actions gave no consideration to the short term or long term conservation needs of the murrelet when they where planned, whereas the Headwaters acquisition and PALCO SYP/HCP were planned with the long term survival and recovery needs of the murrelet as a major design objective. Although there are short term adverse effects while meeting the applicant's economic needs, the FWS expects the proposed action to provide long lasting and permanent recovery benefits to the murrelet and concludes issuance of an HCP permit is consistent with section 7 and section 10 of the Act.

Marbled murrelet critical habitat

As detailed above in the effects section, the proposed action will have a moderate quantitative impact on designated critical habitat at the local scale, and small quantitative impacts through removal of designated critical habitat at the Conservation Zone and range-wide scales. Consideration of qualitative aspects substantially reduces the degree of impact to a level below that derived from simple quantitative assessment. Because most of the high quality critical habitat will be retained, and because the acquisition and establishment of the reserve system will provide for aggregation of high quality uncut old-growth, improving residual, and adjacent second growth into the largest available blocks of habitat containing primary constituent elements that exist within CHU CA-03-a, this unit will continue to contribute to the survival and recovery of marbled murrelets in the local area and in Conservation Zone 4. Therefore, the FWS concludes that, while the proposed action is likely to have some adverse effects on designated critical habitat for the marbled murrelet, it will not appreciably reduce the ability of the critical habitat to function in achieving conservation zone goals, and thus, will not result in destruction or adverse modification of critical habitat.

Western snowy plover and proposed critical habitat

No snowy plovers are known to occur on any lands under the control of PALCO within the action area. Conservation measures in place as part of the proposed SYP/HCP provide for the protection of snowy plovers should the species expand its range onto PALCO lands, or should PALCO acquire lands within the range of the plover in the action area. These protection measures would be consistent with measures in place within the action area at that time. No critical habitat has been proposed to date within the action area, although a future proposal and final rule may include gravel bars on the Eel River. A future assessment of PALCO gravel operations will address potential impacts of existing gravel extraction activities on downstream plover habitat.

Coho salmon and proposed critical habitat

After reviewing the current status of the SONCC coho salmon ESU, the environmental baseline for the action area, the effects of the proposed SYP/HCP, and the cumulative effects, it is NMFS's biological opinion that the action, as proposed, is not likely to jeopardize the continued

existence of coho salmon in the SONCC ESU. In addition, the action as proposed, is not likely to destroy or adversely modify proposed critical habitat for the SONCC coho salmon.

PROPOSED SPECIES:

Chinook salmon and proposed critical habitat

After reviewing the current status of chinook salmon in the SOCC ESU, the environmental baseline for the action area, the effects of the proposed SYP/HCP and the cumulative effects, it is the FWS's conference opinion that the action, as proposed, is not likely to jeopardize the continued existence of proposed chinook salmon in the SOCC ESU, and is not likely to destroy or adversely modify proposed critical habitat for the SOCC chinook salmon.

UNLISTED SPECIES

The Services have reviewed the current status of an additional ten species proposed by the applicant for coverage under the IA. Based on the review and after considering the environmental baseline for the action area, the effects of the proposed issuance of an incidental take permit, and the cumulative effects, it is the opinion of the Services that, should any of these species be listed in the future, the issuance of the subject incidental take permit and execution of the associated IA for the proposed action, as set forth in the SYP/HCP, are not likely to jeopardize the continued existence of the ten covered species. Refer to the **Species response to a proposed action** section above for additional information on the basis for this conclusion.